

ARE ECONOMIC ENTOMOLOGISTS BECOMING "INSECTICIDE MINDED?"

BY ALVAH PETERSON
OHIO STATE UNIVERSITY

The author submitted to the North Central Entomologists for their 1931 meeting at Urbana, Illinois, a topic similar to the title of this article. It aroused considerable discussion and debate. Since that meeting the author has made further inquiry into this question. There are at least two sources from which one can obtain data which will show the extent of the insecticide point of view of economic entomologists. If one studies the budgets of various entomological institutions in the United States one may learn from these the extent of the insecticide work. By this study one can ascertain the extent of the insecticide work now in progress but it is difficult to ascertain from past budgets what the extent of the insecticide work was 15 to 20 years ago. The author soon learned by correspondence and visits that it would require a great deal of time, personal visits and considerable money to get facts from the budgets which would show the status of insecticide work over a period of 15 to 20 years from a number of institutions. The little information he was able to assemble from such a study indicated strongly that much more insecticide work is in progress to-day than was the case 15 to 20 years ago.

The second method employed was a careful examination of the contents of the entomological literature appearing in the various important journals and in federal and state experiment station bulletins and reports. Such an examination should give a picture of an economic entomologists's point of view and undoubtedly is a good criterion of what they have done and are doing. The author selected for detailed analysis the *Journal of Economic Entomology* and the *Review of Applied Entomology*, Series A.

In the *Journal of Economic Entomology*, the author counted and assembled the insecticide papers at five-year intervals for

the following years: 1909–1911, 1914–1916, 1919–1921, 1924–1926, and 1929–1931. Table I shows the results and it will be

TABLE I

TABLE SHOWING PERCENTAGE OF PAPERS DEALING WITH INSECTICIDES AND BIOLOGICAL CONTROL PUBLISHED IN THE JOURNAL OF ECONOMIC ENTOMOLOGY AND ABSTRACTED IN THE REVIEW OF APPLIED ENTOMOLOGY, SERIES A.

Jour. Econ. Entomology. Five year intervals—(three year periods)	1909–11	1914–16	1919–21	1924–26	1929–31
Insecticide papers	17	15	23	33	32
Biological control papers	7	11	4	7	8
Review of Applied Entomology Series A. Five year intervals		1915	1920	1925	1930
Insecticide papers		17	16	28	29
Biological control papers		15	8	9	10

noted that the percentage of insecticide papers appearing from 1924 to date is twice as great (32–33 per cent.) as the percentage appearing from 1909–1916 (15–17 per cent.). It may be argued by some that the Journal of Economic Entomology does not truly represent the work of an economic entomologist because practically all insecticide papers appear in this Journal, while biological papers would be published elsewhere. To answer this argument the author examined the contents of all entomological papers from the United States that were abstracted and reviewed in the Review of Applied Entomology, Series A, for the years 1915, 1920, 1925, 1930. Table I shows conclusively that during the years 1925 and 1930 the percentage of insecticide papers was nearly twice (28 and 29 per cent.) that for 1915 and 1920 (17 and 16 per cent.). Table II totals all the insecticide papers from the United States abstracted for the above years in the Review of Applied Entomology, Series A. The total numbers of papers of economic interest during the past 5 to 7 years is 1.3 times greater than 12 to 17 years ago, but the insecticide

TABLE II

TABLE SHOWING THE TOTAL NUMBER OF INSECTICIDE AND BIOLOGICAL CONTROL PAPERS COMING FROM THE UNITED STATES ABSTRACTED IN THE REVIEW OF APPLIED ENTOMOLOGY, SERIES A., FOR 1915, 1920, 1925 AND 1930

Year and Publications	1915	1920	1925	1930	Ratio of 1915-1920 to 1925-1930
Total number of all papers	455	368	462	620	1: 1.3
Insecticide papers	80	60	132	185	1: 2.2
Papers with insecticide notes	52	64	55	63	1: 1
Both	132	124	187	248	1: 1.7
Biological control papers	72	30	45	67	1: 1.1
Papers with Biological control notes	59	40	37	32	1: .7
Both	131	70	82	99	1: .9

papers are 2.2 times greater. It will also be noted that the number of papers containing miscellaneous insecticide notes and discussion show little or no increase. This decided increase in the percentage of insecticide papers must be significant. Undoubtedly economic entomologists are more "insecticide minded" than they were 15 to 20 years ago.

In conversing with entomologists in general one gains the impression that to-day we are conducting much more research along fundamental biological lines than in the past. Some work of this character is going on at all times, yet the percentage probably is no greater than it was a number of years ago, at least this appears to be true in the field of biological control. Since the author is primarily interested in biological control (natural enemies of insects) he has examined the literature to see the extent and nature of the research work conducted in this field. The percentage of papers that appeared on biological control 15 to 20 years ago is as great or greater than what has appeared during the past 5 to 7 years (Tables I and II). Also the number and percentage of biological control papers 15 to 20

years ago was approximately equal to those dealing with insecticides. If our publications indicate the trend of economic entomology, then the percentage of entomological work in biological control to-day is little or no greater than it was 15 to 20 years ago.

Forty to fifty years ago entomologists were chiefly concerned with taxonomy, morphology, and the development of insects. About that time a few investigators commenced to think of insect control from an insecticide angle. Since then insecticide control has grown rapidly and to-day it dominates economic entomology. Early in the history of economic entomology entomologists with a smattering of chemical knowledge developed some of our common and most useful insecticides. By their shotgun method and a hit and miss system of study they stumbled onto a few very useful substances. Many of these to-day are still our most important insecticides. During the past ten years comparatively few important products have been added to the list by entomologists. As the development of new insecticides continues are we not rapidly approaching the day when the discovery of new chemicals, useful as insecticides, will be brought about exclusively by chemists and physicists who are equipped to develop useful, synthetic products? Probably before long most insecticide entomologists of necessity will be routine testers, or pseudo-chemists, observing the results obtained with products A, B and C, which are "brain children" of chemists and physicists.

Past and present day circumstances demand immediate answers to our problems, consequently entomologists have been forced to think of control largely in terms of chemicals. Present day insecticide demands are greater than those of a few years ago because many chemists and large chemical corporations are very much interested in insecticides. When influential groups of chemically minded individuals demand help from entomologists they receive attention where less influential groups of individuals or points of view sponsored by no group in particular get little attention. An economic entomologist soon finds that he is spending a great deal of time and thought upon insecticides. If an entomologist continues in an insecticide environ-

ment for a prolonged period he gradually reaches the stage where he thinks of insect control almost exclusively from an insecticide point of view. Some of our colleagues in charge of entomological research projects and institutions apparently have reached this stage and, as a consequence, have a decidedly warped point of view of economic entomology. After all is said and done, isn't an entomologist supposed to be a biological scientist who knows his insects? If such is the case, some of our economic "insecticide" entomologists are fundamentally no longer real entomologists. The insecticide fog in which they are completely submerged prevents their seeing the possibilities for control in the fields of ecological and biotic relationships.

At this point the author cannot refrain from making the following statement even though he does not intend to discuss the same in this publication. In general twenty or more years of research work by biologically trained entomologists in the fields of ecological and biological control of insects will produce as great or more beneficial and practical results than a similar amount of time devoted to insecticides. Most insecticide entomologists will be unable to see or believe this statement. In all probability the author himself ten to fifteen years ago, when he was immersed in nicotine, paradichlorobenzene and other chemicals would have regarded such a statement as fallacious.

In some future publication the author may analyze and discuss this question; however, for the present he wishes to emphasize one important point of view which most economic entomologists fail to recognize or appreciate. In general, entomologists only see and think about those insects producing direct or indirect injury to man. If we examine the splendid book on destructive insects by Metcalf and Flint, we find listed 500 or more insect pests. How does this number compare with the 50,000 to 100,000 or more insects recorded for this country. For the sake of argument, say 1 per cent., or 1 out of 100. How many economic entomologists ever think of the 99 per cent. of the insects about us? It is highly probable that 50 per cent. or many more of all insect species are potential pests. What prevents the unimportant insects from becoming economic pests? Very few entomologists can answer this question for any unimportant insect. This brings up the important and startling situation:

What are we doing as economic entomologists? We are studying and worrying about the few species, 1 out of 100, which nature has failed to keep in check so far as man's interests are concerned. Briefly stated, we are devoting all our time to the insects which are successful in a man-made environment and by insecticides we are endeavoring to temporarily place these pests among the 99 out of the 100.

Let us compare our entomological business with that of the commercial world. Supposing a group of retail business men were endeavoring to ascertain the reasons for failures in certain lines, would they devote all their studies to those few concerns that had succeeded? Undoubtedly, they would investigate both the failures and successes in their field. Some day, perhaps in our generation, entomologists are going to see and study insects other than those confined to the 1 per cent. group. When that time comes we will be encouraged and paid to investigate with great care the numerous and unlimited examples of natural insect control about us on all sides. Undoubtedly careful studies will reveal facts, theories, and laws which man will eventually harness and employ to bring about a control of our major pests. To-day we are too busy worrying about the insects nature fails to control.

The author appreciates that the above thoughts may be idealistic, yet he feels that many of our economic entomologists are so steeped in oil emulsions, pyrethrum sprays, fluosilicates, etc., they fail to appreciate or sponsor the broader and more fundamental studies of the very insects they are trying to control and also the thousands of uncommon insects about them which hold for us answers to our problems.

Fortunately to-day the science of entomology shows signs of awakening to some of the possibilities in ecological and biological control due largely to the failure of insecticides in the control of a number of major insect pests. This change in the point of view of possible control is very encouraging and here is hoping this new awakening survives. It needs decided encouragement in this utilitarian age which demands immediate results.

In conclusion the author wishes to have it understood that he does not oppose the fundamental work with insecticides now in

progress at some institutions. His only wish is that entomological executives in charge of insect projects in various institutions will sanction, encourage and boost long-time investigations in the fields of ecological and biological control. If ecological and biological control projects are given opportunities equal in all respects to insecticide studies now in progress, the author firmly believes the younger entomologists will live to see wonders accomplished in these fields.